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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,674	04/08/2004	Salman Akram	97-1363.6	8521
22823	7590	12/23/2004	EXAMINER	
STEPHEN A GRATTON THE LAW OFFICE OF STEVE GRATTON 2764 SOUTH BRAUN WAY LAKEWOOD, CO 80228			THAI, LUAN C	
			ART UNIT	PAPER NUMBER
			2829	

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

**Application No.**

10/820,674

**Applicant(s)**

AKRAM ET AL.

**Examiner**

Luan Thai

**Art Unit**

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 September 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 63-66 and 90-102 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 63-66 and 90-102 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/8/04&amp;9/7/04</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group III, claims 63-66 and 90-102 in Paper No. 3 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Priority***

2. This application appears to be a division of Application No. 09/961,646, filed 9/25/01.

### ***Information Disclosure Statement***

3. The Information disclosure Statements filed on 4/8/04 and 9/7/04 has been considered.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

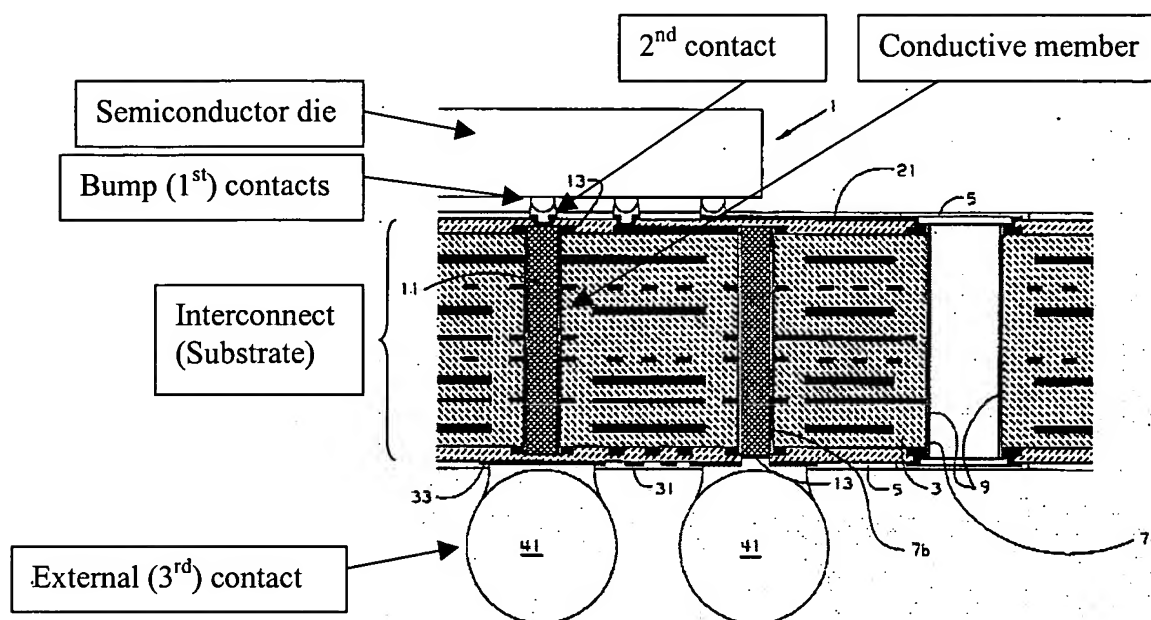
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 63, 65-66, 90, 92-94, 96, 98-99, and 102 are rejected under 35 U.S.C. 102(b) as being anticipated by Bhatt et al (5,487,218).

The reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 63, 65-66, 90, 92-94, 96, 98-99, and 102, Bhatt et al (see figure 1 attached) disclose a semiconductor package comprising:

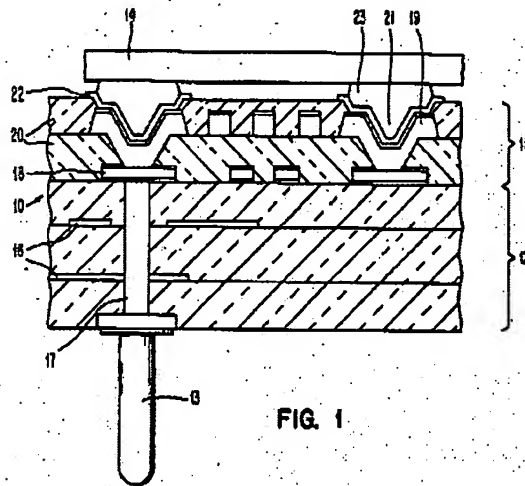


a semiconductor die comprising a plurality of first contacts (e.g., bump contacts); an interconnect attached to the die comprising: a substrate having a first side and an opposing second side; a plurality of second contacts on the first side that comprise recesses and conductive layers on the recesses bonded to the first contacts (e.g., bump contacts) on the die; a plurality of conductive members in the substrate in electrical communication with the second contacts comprising openings extending from the first side to the second side and a conductive material (11) in the openings, wherein the conductive material comprises a metal or a conductive polymer (Col. 4, lines 4-38); and a plurality of third contacts (e.g., solder balls 41) on the second side in electrical communication with the conductive members.

6. Claims 63, 65-66, 90, 92-93, 96, 98, and 101 are rejected under 35 U.S.C. 102(b) as being anticipated by Geldermans et al (4,617,730).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 63, 65-66, 90, 92-93, 96, 98, and 101, Geldermans et al (see figure 1 attached below) disclose a semiconductor package comprising:

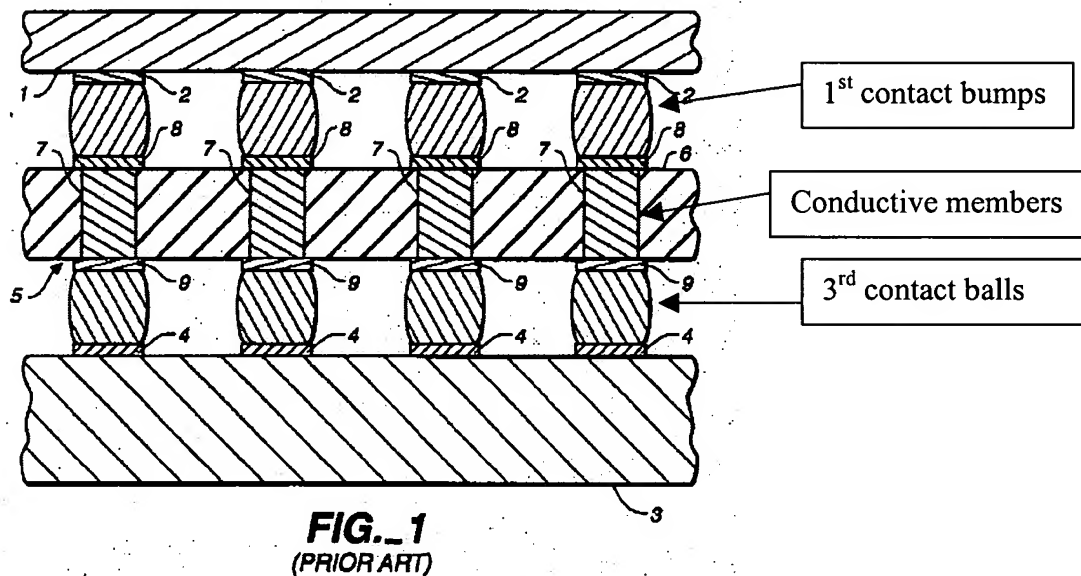


a semiconductor die (14) comprising a plurality of first contacts (e.g., bump contacts 23);  
an interconnect (11-12) attached to the die comprising: a substrate comprising a ceramic material (Col. 1, line 15) and having a first side and an opposing second side; a plurality of second contacts (19/22) on the first side that comprise recesses and conductive layers (19/22) on the recesses bonded to the first contacts (e.g., bump contacts 23) on the die (14); a plurality of conductive members (17) in the substrate in electrical communication with the second contacts (19/22) and comprising openings extending from the first side to the second side and a conductive material (17) in the openings, wherein the conductive material (17) comprises a metal (Col. 1, line 51); and a plurality of third contacts (e.g.,

pins 13) on the second side in electrical communication with the conductive members (17).

7. Claims 63, 65-66, 90, 92, 94, 96, 98-99, and 101 are rejected under 35 U.S.C. 102(b) as being anticipated by Vafi et al (5,474,458).

Regarding claims 63, 65-66, 90, 92, 94, 96, 98-99, and 101, Vafi et al (see figure 1 attached below) disclose a semiconductor package comprising:



a semiconductor die (1) comprising a plurality of first contact bumps; an interconnect (5) attached to the die comprising: a substrate (6) comprising a ceramic material (Col. 1, lines 33-34) and having a first side and an opposing second side; a plurality of second contacts (8) on the first side comprising conductive layers (8) bonded to the first contacts bumps on the die (1); a plurality of conductive members (7) in the substrate in electrical communication with the second contacts (8), wherein the conductive members (7) comprise openings extending from the first side to the second side and a conductive

material (7) in the openings; and a plurality of external third contact balls on the second side in electrical communication with the conductive members (7).

8. Claims 63, 65, 90-91, 96, and 100 are rejected under 35 U.S.C. 102(b) as being anticipated by Capps et al (5,432,999).

Regarding claims 63, 65, 90-91, 96, and 100, Capps et al (see figure 9 attached) disclose a semiconductor package comprising:

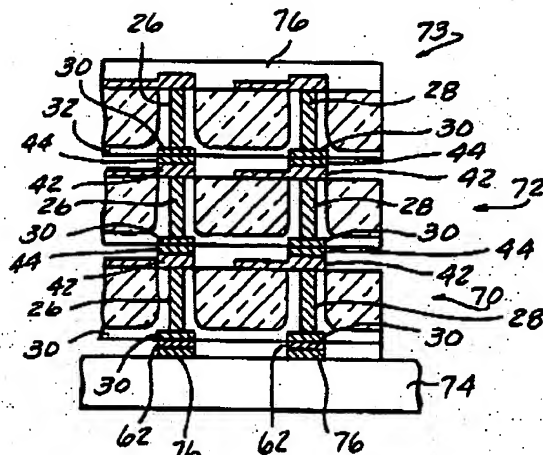


FIG - 9

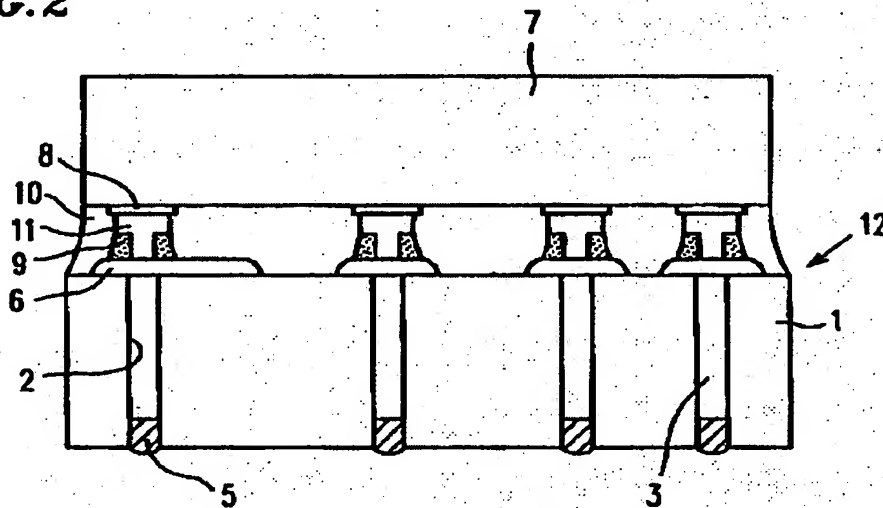
a semiconductor die (72) comprising a plurality of first contacts (44); an interconnect (70) attached to the die (72) comprising: a substrate (70) having a first side and an opposing second side. Since the interconnect substrate (70) is disclosed as a integrated circuit die (Col. 8, lines 6+), the interconnect substrate (70) is inherent to comprise a semiconductor material. Capps et al. further disclose a plurality of second contacts (42) on the first side of the interconnect (70) and comprising conductive layers (42) bonded to the first contacts (44) on the die (72); a plurality of conductive members (28) in the substrate (70) in electrical communication with the second contacts (42), wherein the conductive members comprise openings extending from the first side

to the second side and a conductive material (28) made of metal in the openings; and a plurality of external third contact (30/62) on the second side in electrical communication with the conductive members (28).

9. Claims 63-66, 90, 92, 94-99, and 101 are rejected under 35 U.S.C. 102(b) as being anticipated by Tomura et al (5,640,051).

Regarding claims 63-66, 90, 92, 94-99, and 101, Tomura et al (see figure 2 attached below) disclose a semiconductor package comprising:

**FIG. 2**



a semiconductor die (7) comprising a plurality of first contact bumps (11); an interconnect substrate (12) comprising a ceramic body (1), having a first side and an opposing second side, and attached to the die (7); a plurality of second contacts (6) on the first side comprising conductive layers (6) bonded to the first contacts bumps (11) of the die (7); a plurality of conductive members (3) in the substrate in electrical communication with the second contacts (6), wherein the conductive members (3) comprise openings (2) extending from the first side to the second side and a conductive material (3) in the openings; and a plurality of external third



contact bumps (5) on the second side in electrical communication with the conductive members (3). Tomura et al disclose the package further comprising an underfill layer (10) between the face of the die (7) and the first side of the interconnect substrate (12).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

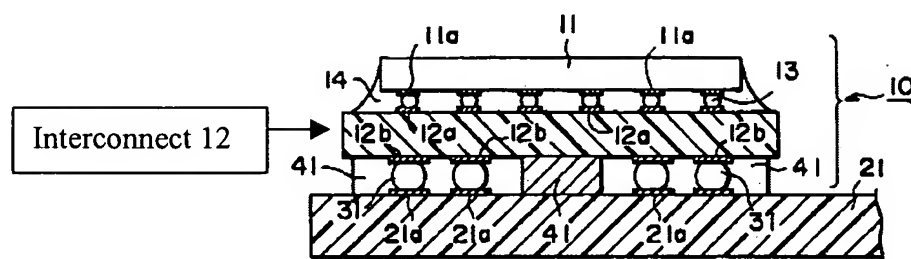
11. Claims 64, 95 and 97 are rejected under 35 U.S.C. 103(a) as being unpatentable over each of Bhatt et al (5,487,218), Geldermans et al (4,617,730), and Vafi et al (5,474,458) in combination with Iwasaki (5,834,848).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 64, 95 and 97, each of Bhatt et al, Geldermans et al, and Vafi et al., disclose the claimed invention as detailed above except for the package comprising an underfill layer between the face of the die and the first side of the interconnect.

Iwasaki, while related to a similar semiconductor package design teaches (fig. 1)

FIG. 1



an underfill layer (14) being filled between the face of the die (11) and the first side of the interconnect (12) in order to protect the connections between the die and the interconnect (Col. 10, lines 6+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining of Iwasaki's teachings of the under fill layer with each of Bhatt et al, Geldermans et al, and Vafi et al. device package would have been beneficial because Iwasaki's teachings help protecting the connections between the die and the interconnect.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is 571-272-1935. The examiner can normally be reached on 6:45 AM - 4:15 PM, Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on 571-272-2034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Luan Thai', with a long, sweeping horizontal stroke extending to the right.

***Luan Thai***

Primary Examiner

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December 21, 2004